REMARKS

The Office Action dated June 15, 2004 has been carefully considered. Claims 1-14 have been cancelled. Claims 15-19 have been added. Claims 15-19 are in this application.

The Examiner required restriction to one of the following groups:

I. Claims 1-12, drawn to an apparatus for the treatment of a waste gas containing combustible compounds, classified in class 422, subclass 173.

II. Claims 13-14, drawn to a method for treatment of a waste gas containing combustible compounds, classified in class 423, subclass 245.

Applicant confirms the oral election of Group I. Claims 15-19 correspond to the invention of Group I. Claims 13 and 14 directed to a nonelected invention have been cancelled. Applicants reserve the right to file a divisional application directed to the nonelected invention.

The previously presented claims were rejected under 35 U.S.C. § 103 as obvious in view of U.S. Patent No. 3,988,423 to Ohrui et al. in combination with U.S. Patent No. 4,418,045 to Sato et al. and further in combination with U.S. Patent No. 4,038,032 to Brewer et al. and U.S. Patent No. 4,101,632 to Lamberti et al. Applicants submit that the teachings of these references do not teach or suggest the invention defined by the present claims.

In accordance with the amended claims, the molecular oxygen-containing gas is supplied to two points in the apparatus at a waste gas inlet of the first pre-heater device and to at least one region of the apparatus between a waste gas outlet of the first pre-heater device. Accordingly, as described in the specification on page 16, lines 12-19, the flow volumes balance and the heat balance of gases in the apparatus for the treatment can be changed more widely. In accordance with the present invention, it is enabled to elevate the temperature of the treated gas at the outlet of the first pre-heater to a level higher than the dew point of the gas for the same amount of the molecular oxygen-containing gas as in conventional apparatus and consequently eliminate the trouble related to condensation and permit the heat generated by the catalytic oxidation of the waste gas to be recovered to the largest possible extent, as described in the specification on page 6, line 28 through page 7, line 3.

U.S. Patent No. 3,988,423 to Ohrui et al. describe a method for removing harmful materials from waste gas which comprises dividing the waste gas exhausted from the adsorption of acrylonitrile into two flows mixing the first flow gas with air in an amount necessary for

combustion of the combustible gas contained in the whole waste gas, subjecting the main flow gas of the mixed gas thus obtained to heat-exchange with the gas of the outlet of the first catalyst layer, combining the main flow gas with the remainder of the mixed gas, preheating thereby the mixed gas at a temperature of 200° C to 450° C, passing the preheated mixed gas through the first catalyst layer wherein at least one noble metal is dispersed on an alumina carrier, and therein burning the gas at a temperature of 650° C to 750° C in the presence of an excess amount of oxygen to give a combustion gas, combining the combustion gas with the second flow gas which is preheated by subjecting the main flow gas of the second flow gas to heat-exchange with the gas of the outlet of the second catalyst layer and combining the main flow gas with the remainder of the second flow gas, and thereby controlling the temperature of the combustion gas to 250° C to 450° C, passing the combustion gas combined with the second flow gas through the second catalyst layer, and therein burning the gas at a temperature of the outlet of 600° C to 750° C in a concentration of the remaining oxygen of 0 to 0.5 % by volume.

In contrast to the invention defined by the present claims, Ohrui et al. do not teach or suggest an apparatus for treating waste gas in which a molecular oxygen-containing gas supplying device supplies molecular oxygen to two parts in the apparatus. Further, Ohrui et al. do not teach or suggest that the molecular oxygen-containing gas supplying device supplies the oxygen-containing gas to a waste gas inlet of a first preheater and to at least one region of the apparatus between a waste gas outlet of the first preheater and an inlet of a catalytic oxidation reactor, as defined by the present claims. Rather, Ohrui et al. disclose in Fig. 1 that waste gas is introduced through line 1 and then divided into the first flow (line 2) and the second flow (line 9). (Col. 3, lines 58-63). For supplementing an insufficient amount of oxygen to complete the combustion, air is supplied to the first flow line 1 from line 19. Moreover, even if the air is supplied from line 19, sufficient air is not supplied to the second heat exchanger 18. Further, Ohrui et al. do not teach or suggest supplying molecular oxygen-containing gas at two points in the apparatus being capable of adjusting the temperature of the treated gas in a first waste gas preheater to an arbitrary temperature not lower than the dew point thereof, being capable of being stably operated without the supply of the molecular oxygen-containing gas in an unduly large amount, and being capable of recovering the heat generated by the catalytic oxidation of the waste gas to the largest possible extent, as described on page 3, line 31 through page 4, line 5

of the present application. As shown in table 1 of Example 2 of the present application, the temperature at the outlet of the first preheater was heightened to 127° C upon supplying molecular oxygen-containing gas to two points on the apparatus. Accordingly, the invention defined by the present claims is not obvious in view of Ohrui et al.

Sato et al. disclose a method for disposal of waste gas, which method comprises (a) heating the incoming waste gas containing hydrocarbons, carbon monoxide, and other inflammable organic compounds with the gas obtained by removing heat from the outlet gas of the catalytic-oxidation reactor, (b) further heating the resultant hot waste gas with part of the outlet gas of the catalytic-oxidation reactor, (c) subjecting the heated waste gas to complete oxidation in the catalytic-oxidation reactor thereby rendering the waste gas no longer noxious, (d) diverting part of the outlet gas of the catalytic-oxidation reactor to be used for heating the aforementioned heated waste gas, (e) causing at least part of the outlet gas of the reactor which has been used for heating the waste gas to mingle with the remainder of the outlet gas of the reactor, (f) causing the remainder of the outlet gas of the reactor which has been used for heating the waste gas to mingle with the aforementioned heated waste gas, and (g) subjecting to heat recovery the mixture of the remainder of the outlet gas of the reactor with at least part of the outlet gas of the reactor which has been used for heating the waste gas.

In contrast to the invention defined by the present claims, Sato et al. do not teach or suggest an apparatus for treating waste gas in which a molecular oxygen-containing gas supplying device supplies molecular oxygen to two parts in the apparatus. Further, Sato et al. do not teach or suggest that the molecular oxygen-containing gas supplying device supplies the oxygen-containing gas to a waste gas inlet of a first preheater and to at least one region of the apparatus between a waste gas outlet of the first preheater and an inlet of a catalytic oxidation reactor. Instead, Sato et al. teach away from the present invention by teaching it is disadvantageous to introduce air into the apparatus. In particular, Sato et al. disclose that when the quantity of the heat generated by the incoming the waste gas is large, the outlet gas temperature of the reactor is proportionally high. For effective control, air must be introduced from the ambience into the waste gas. This addition of air has an inevitable effect of increasing the total volume of the waste gas and consequently increasing the quantity of the heat entrained by the gas. It also brings about a disadvantage that the constancy of the oxygen concentration in

the outlet gas is impaired and the reuse of the treated waste gas is inconvenienced. (Col. 3, lines 10-30). Further, Sato et al. describe that in the process of Fig. 1, the control of the outlet gas temperature of the catalytic oxidation reactor 36 can be performed by increasing the amount of ambient air being introduced. The fact that this measure inevitably lowers the heat recovery ratio is evident from the trend shown in the graph of Fig. 4. (Col. 7, lines 50-55). Accordingly, persons of ordinary skill in the art would not introduce air into the Sato et al. apparatus and Sato et al. do not cure the deficiencies of Ohrui et al. noted above.

Brewer et al. disclose a control system for incineration of pollutants in waste gas which embodies feed back signals from temperature sensing means and/or gas analyzing means to detect an undesired temperature variations and provide incremental control changes to effect a change in temperature control level and the incremental stepping down or stepping up of a set point for the control of fuel flow to the heat supplying burner of the incineration zone.

In contrast to the invention defined by the present claims, Brewer et al. do not teach or suggest an apparatus for treating waste gas in which a molecular oxygen-containing gas supplying device supplies molecular oxygen to two parts in the apparatus. Further, Brewer et al. do not teach or suggest that the molecular oxygen-containing gas supplying device supplies the oxygen-containing gas to a waste gas inlet of a first preheater and to at least one region of the apparatus between a waste gas outlet of the first preheater and an inlet of a catalytic oxidation reactor. Thus, Brewer et al. do not cure the deficiencies of Ohrui et al. and Sato et al. noted above.

Lamberti et al. disclose a processing for controlling the amount of air to be mixed with waste gas containing combustibles being fed into a combustion chamber. This process comprises the steps of supplying fuel to the combustion chamber in an amount sufficient to maintain a temperature greater than the combustion temperature of carbon monoxide therein, feeding waste gas containing carbon monoxide to the combustion chamber, measuring the percentage of carbon monoxide in the waste gas, feeding free oxygen to the combustion chamber, exhausting the gas from the chamber, measuring the actual percentage of free oxygen in the exhaust gas, calculating an optimum percentage of free oxygen in the exhaust gas, and adjusting the volume of free oxygen being fed to the combustion chamber in an amount sufficient to produce the optimum percentage of free oxygen in the exhaust gas.

In contrast to the invention defined by the present claims, Lamberti et al. do not teach or suggest an apparatus for treating waste gas in which a molecular oxygen-containing gas supplying device supplies molecular oxygen to two parts in the apparatus. Further, Lamberti et al. do not teach or suggest that the molecular oxygen-containing gas supplying device supplies the oxygen-containing gas to a waste gas inlet of a first preheater and to at least one region of the apparatus between a waste gas outlet of the first preheater and an inlet of a catalytic oxidation reactor. Thus, Lamberti et al. do not cure the deficiencies of Ohrui et al and Sato et al. noted above.

Accordingly, the invention defined by the present claims is not obvious in view of Ohrui et al. in combination with Sato et al., Brewer et al. or Lamberti because none of the references teach an apparatus for treating waste gas in which a molecular oxygen-containing gas supplying device supplies molecular oxygen to two parts in the apparatus.

In view of the foregoing, Applicants submit that all pending claims are in condition for allowance and request that all claims be allowed. The Examiner is invited to contact the undersigned should he believe that this would expedite prosecution of this application. It is believed that no fee is required. The Commissioner is authorized to charge any deficiency or credit any overpayment to Deposit Account No. 13-2165.

Respectfully submitted,

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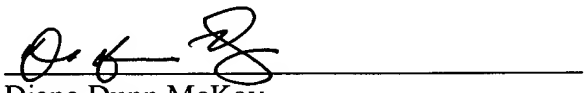

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